

# **Data and Tools for Assessments: The Basic Ingredients**

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# Sea Level Rise and Habitats

Natural resource managers want to know:

- Where will sea levels rise?
- Which habitats are at risk or vulnerable to SLR?  
Can they adapt?
- How will habitats be impacted or change?



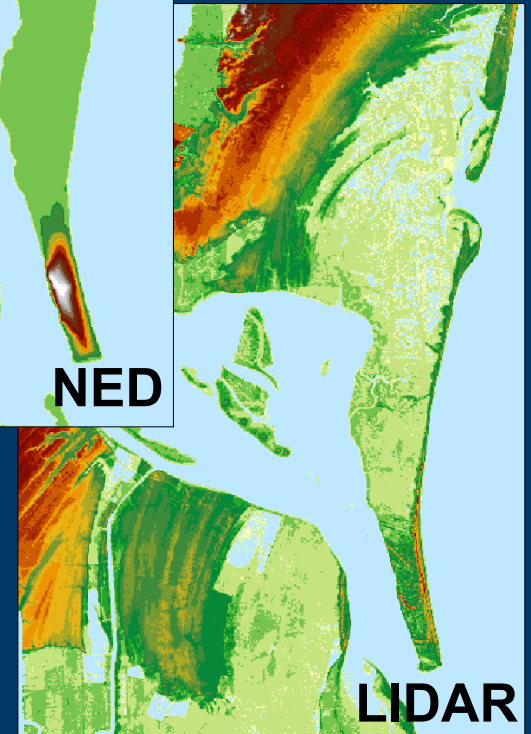
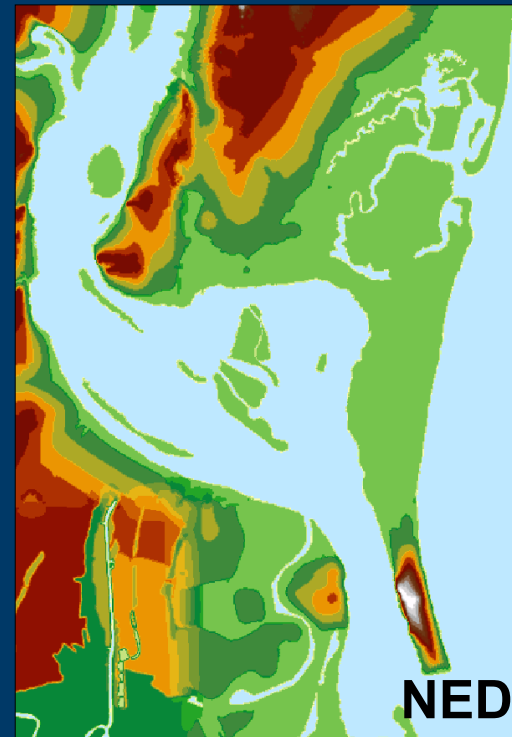
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# Where will Sea Levels Rise?

## Inundation Mapping

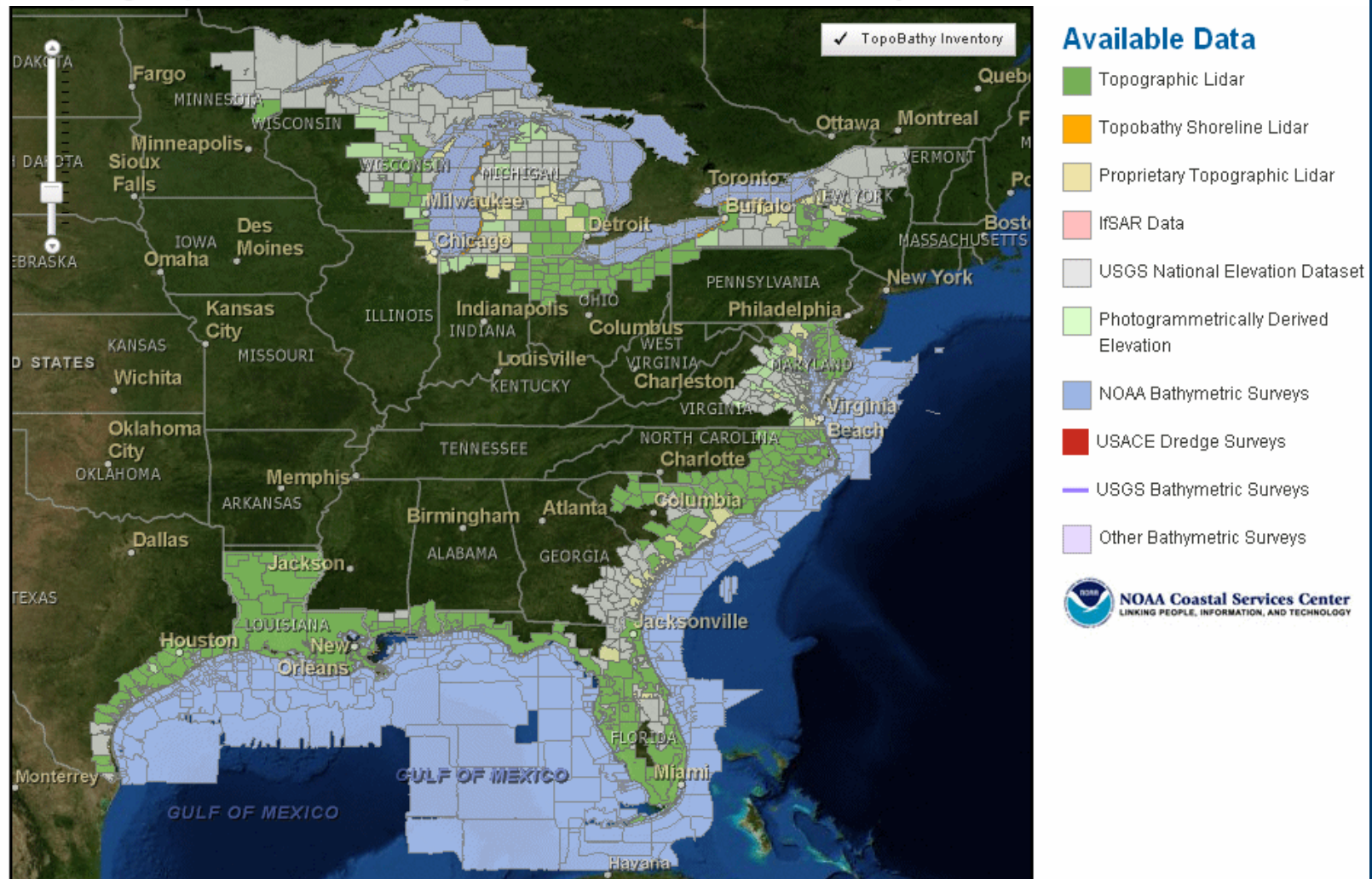
### High-Resolution Elevation Data (e.g., LiDAR)

- Understand requirements, specifications of data
- Error likely in marsh areas, may need to adjust/correct
- Used to create a digital elevation model (DEM)
- Topographic and Bathymetric Data Inventory



# Where will Sea Levels Rise? Inundation Mapping

## Topographic and Bathymetric Data Inventory



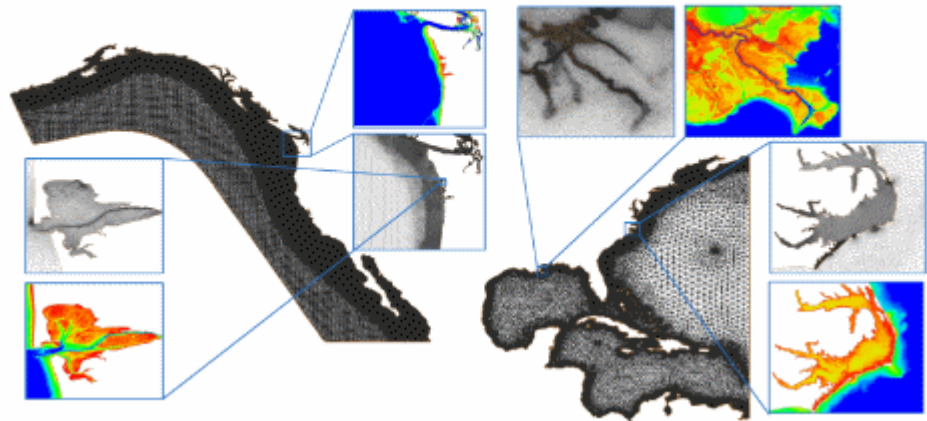


# Where will Sea Levels Rise? Inundation Mapping

## Water level surfaces

- Single value
- Modeled
  - Advanced Circulation Model for Oceanic, Coastal and Estuarine Waters (ADCIRC)

ADCIRC Coastal Circulation and Storm Surge Model



# Where will Sea Levels Rise?

## Visualization Resources

### Examples

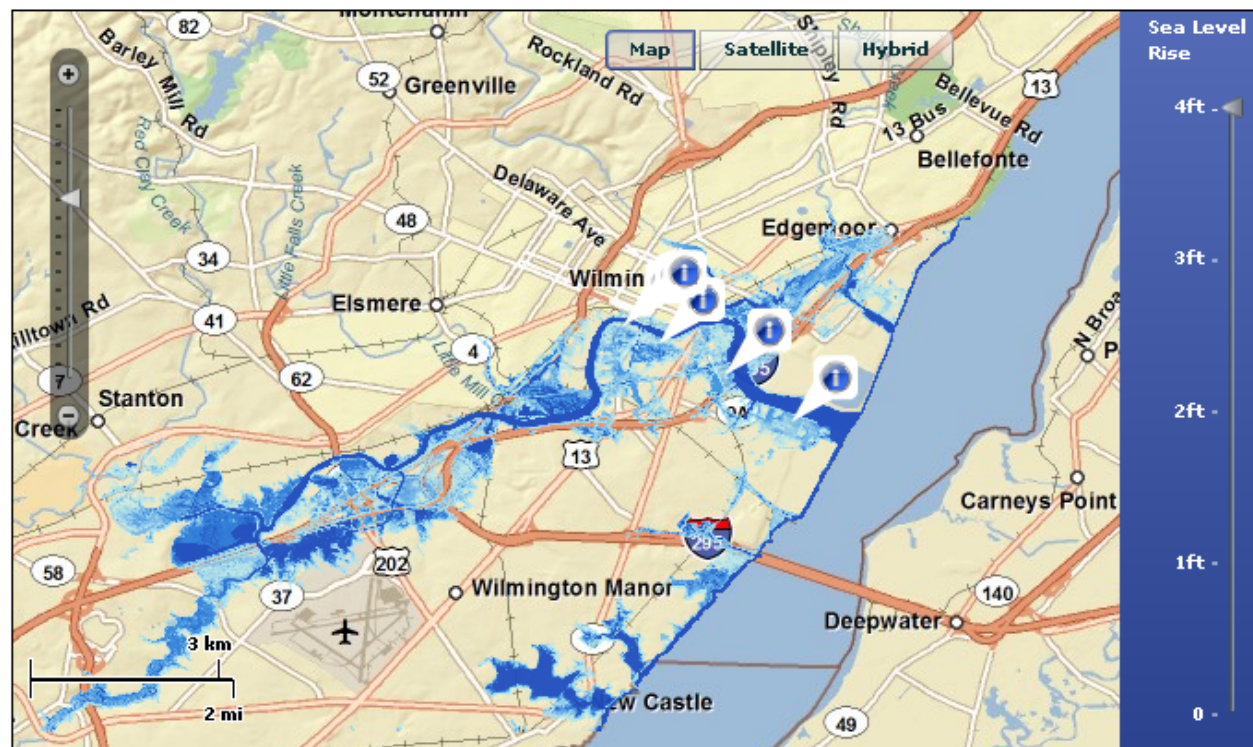
- Sea Level Rise and Coastal Flood Frequency Viewer for Delaware



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# Where will SLR Occur? Visualization Resources

## SEA LEVEL RISE IMPACTS FOR WILMINGTON, DELAWARE



This map shows potential flooding, or inundation, caused by sea level rise. Use the slider bar to view the extent.

The map illustrates the scale of potential flooding, not the exact location, and does not account for erosion, subsidence, or future construction. Water levels are shown as they would appear during an average high tide (mean high water). Rising sea levels will cause daily high tides to reach farther inland.

 Places of interest vulnerable to sea level rise.

**Note:** Flood layers may take a moment to load.

View the [Flood Frequency Predictions](#)

This pilot project is a collaborative effort of NOAA, the U.S. Geological Survey, and the Delaware Department of Natural Resources.

# Where will Sea Levels Rise?

## Visualization Resources

### Examples

- Sea Level Rise and Coastal Flood Frequency Viewer for Delaware
- TNC's Future Scenarios Mapper



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# Where will SLR Occur?

## Visualization Resources

### COASTAL RESILIENCE LONG ISLAND

Adapting Natural and Human Communities to  
Sea Level Rise and Coastal Hazards

Split View Background Map Contents Flood Scenarios Year Sea Level Rise Storm Surge Metadata and Methods

Visible Layer Sorter Perform Analysis

Layers

Results

Ecological

Layer

Group: Marsh

- ☐ Marsh - Potential Migration Impediments
- ☐ Marsh - Type

Group: Marsh - Index

- ☐ Marsh - Population Protection Potential
- ☐ Marsh - Potential Viability

Group: Other Ecological Communities

- ☐ Beach-Dunes - Barrier Islands
- ☐ Piping Plover Habitat - Barrier Islands
- ☐ Submerged Rooted Vascular plants (SRV)

Group: Physical Features

- ☐ LiDAR Elevation
- ☐ LiDAR Hillshade
- ☐ Shoreline Exposure to Wave Energy

Socio-Economic

Boundaries and Buffers



# Where will Sea Levels Rise?

## Visualization Resources

### Examples

- Sea Level Rise and Coastal Flood Frequency Viewer for Delaware
- TNC's Future Scenarios Mapper
- NOAA's Coastal Inundation Viewer (*under development*)



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# Where will Sea Levels Rise? Visualization Resources



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NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

6 ft SLR

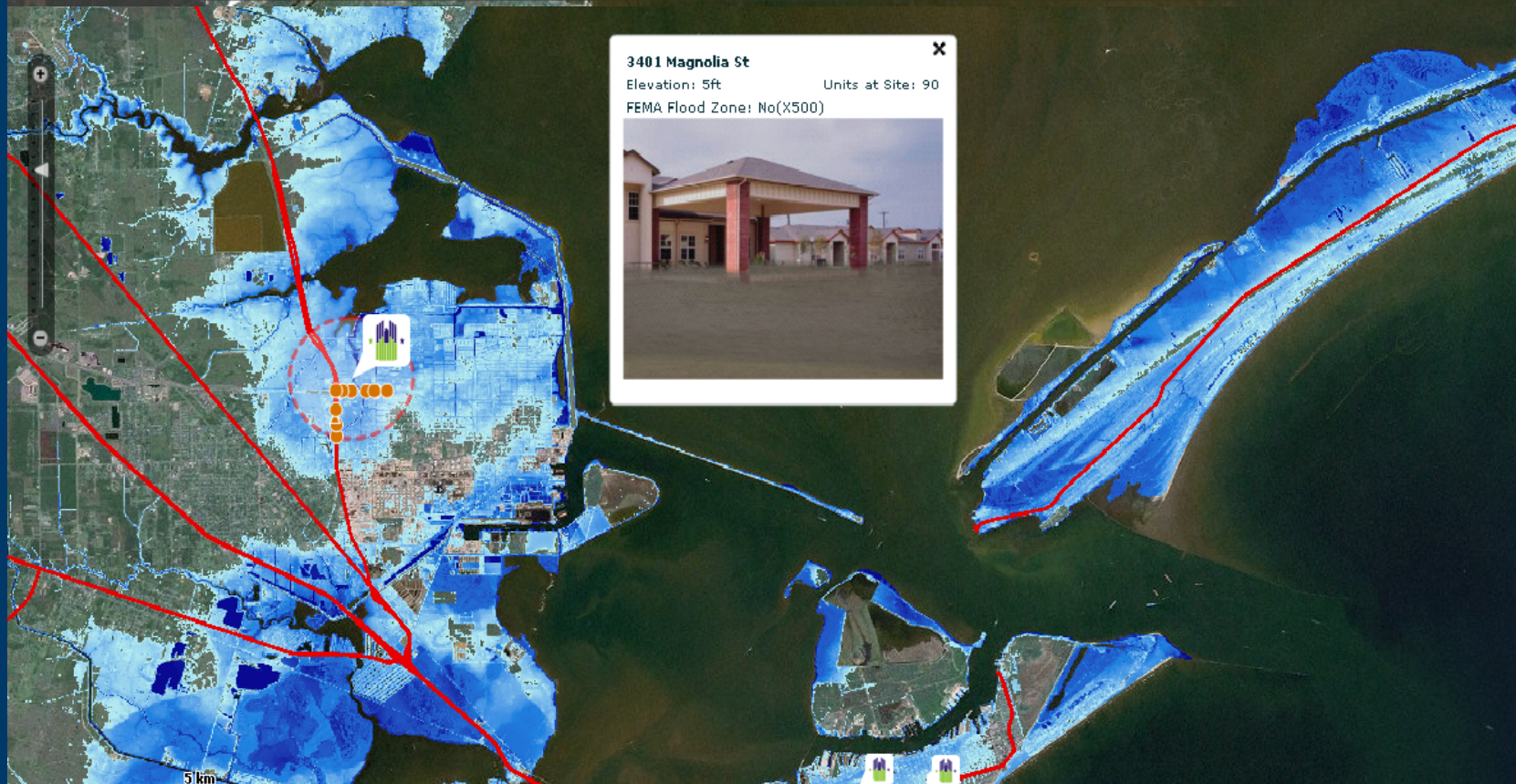


**2** feet deep  
at site

**\$1.18B** Total Losses  
Since 1960

**\$950M** From Hurricanes  
and Tropical Storms

**18%** Chance of  
Hurricane Strike



# Where will Sea Levels Rise?

## Visualization Resources

### Examples

- Sea Level Rise and Coastal Flood Frequency Viewer for Delaware
- TNC's Future Scenarios Mapper
- NOAA's Coastal Inundation Viewer (*under development*)
- CanVis visual simulation software





# Sea Level Rise and Habitats

Natural resource managers want to know:

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- How will habitats be impacted or change?



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# Which Habitats are at Risk?

## Data



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# Which Habitats are at Risk?

## Data

- Current distribution of habitats/wetlands
  - National Wetland Inventory (NWI)
  - Coastal Change Analysis Program (C-CAP)
  - GAP Analysis Program
  - Other local habitat maps



Digital data from the Wetlands Geospatial Layer overlaid with the corresponding black and white imagery.



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# Which Habitats are at Risk?

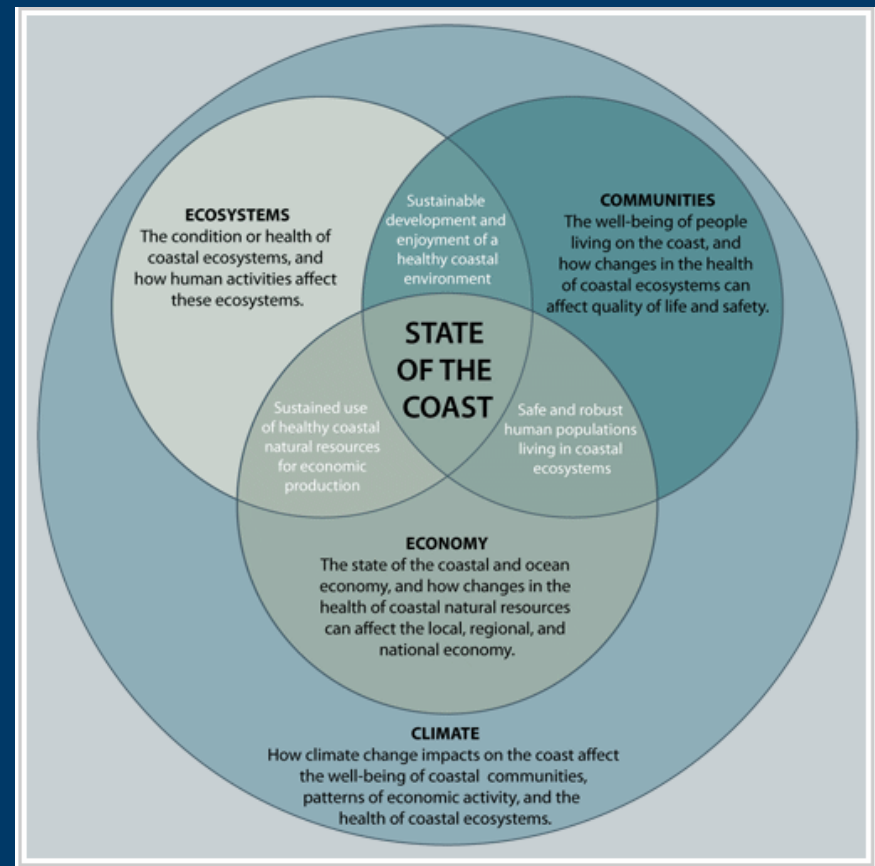
## Data

- Soil type
  - Soil Survey Geographic (SSURGO) data
- Slope, direction (derived from a DEM)
- Shoreline type, change
  - NOAA Shoreline Website
  - Environmental Sensitivity Index (ESI)
- Surrounding land use, impervious surfaces, barriers to migration
  - Impervious Surface Analysis Tool (ISAT)

# Which Habitats are at Risk?

## Data

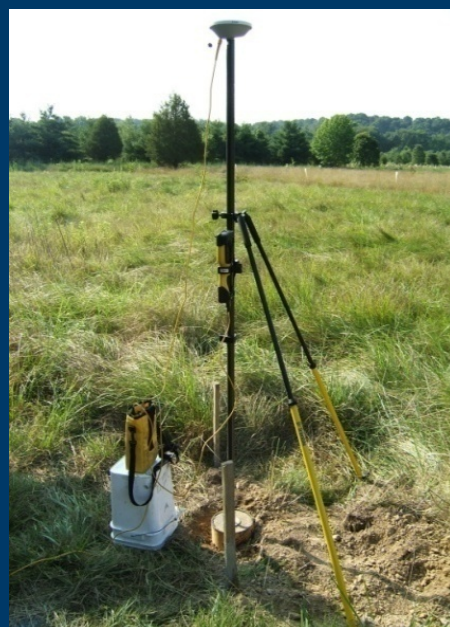
- Development pressures (i.e., demographics, grow-out scenarios)
  - US Census Bureau data
  - National Ocean Economics Program (NOEP) data
- Spatial Trends in Coastal Socioeco. Quick Report Tool
- NOAA's State of the Coast website
- NOAA Coastal County Hazard Snapshots



# Which Habitats are at Risk?

## Vulnerability Indices

- Delaware's Marsh Vulnerability
- NatureServe's Climate Change Vulnerability Index (for specific species)



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# How Will Habitats be Impacted? Spatial Models, Mapping Tools

## Examples

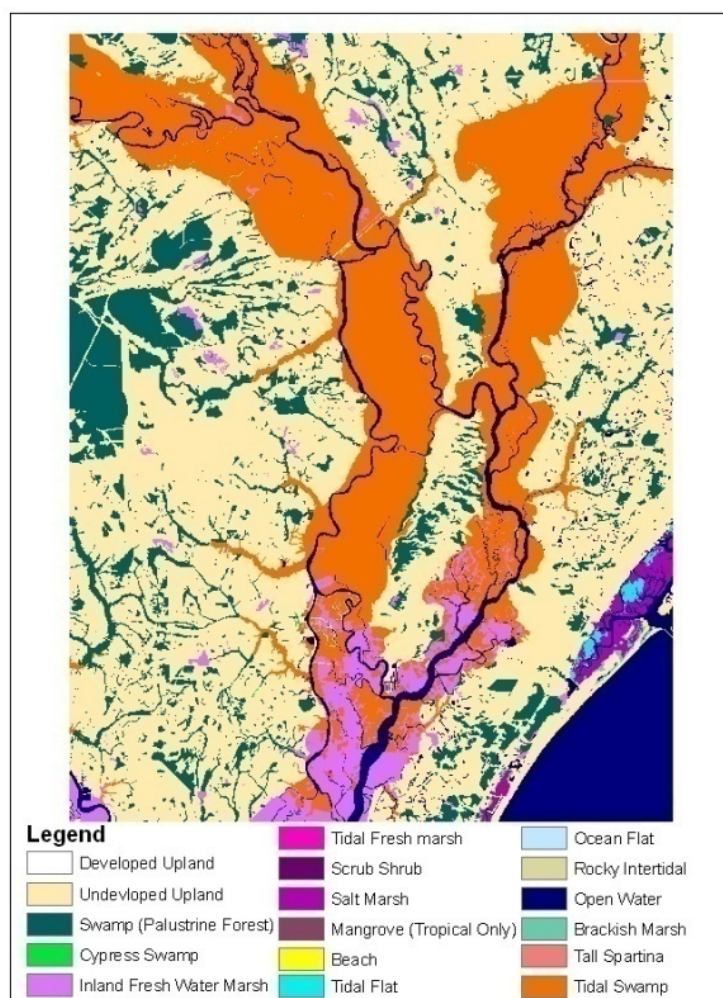
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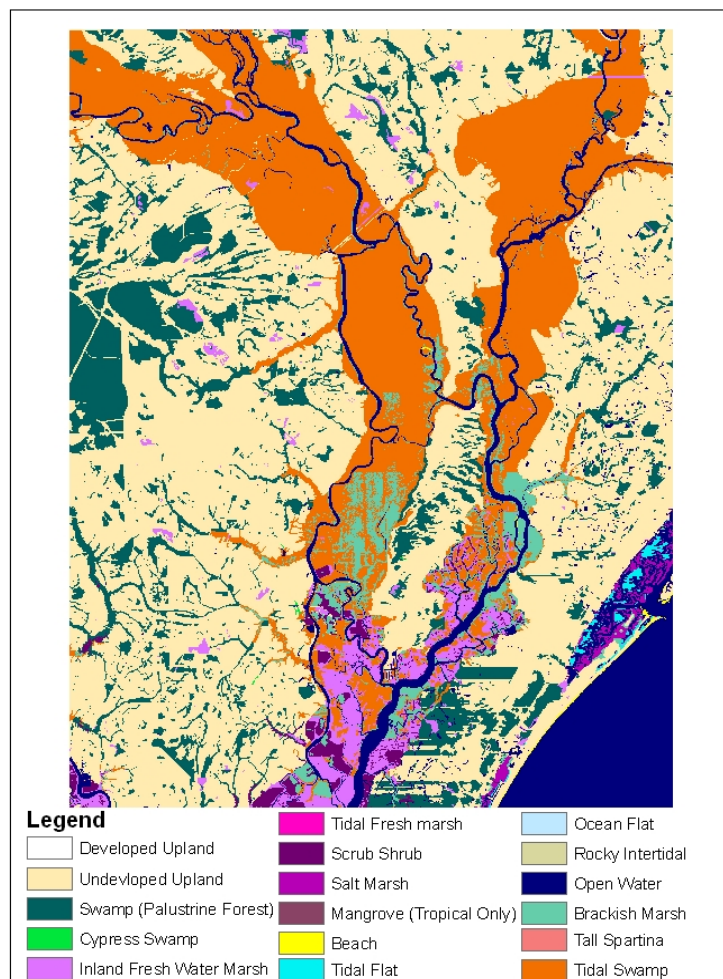
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# How Will Habitats be Impacted?

## Spatial Models, Mapping Tools



SLAMM, Initial Condition



SLAMM, 2025 1m/100yrs SLR

# How Will Habitats be Impacted? Spatial Models, Mapping Tools

## Examples

- Sea Level Affecting Marshes Model (SLAMM)
- NOAA Coastal Inundation Viewer (*under development*)
  - Marsh migration methodology



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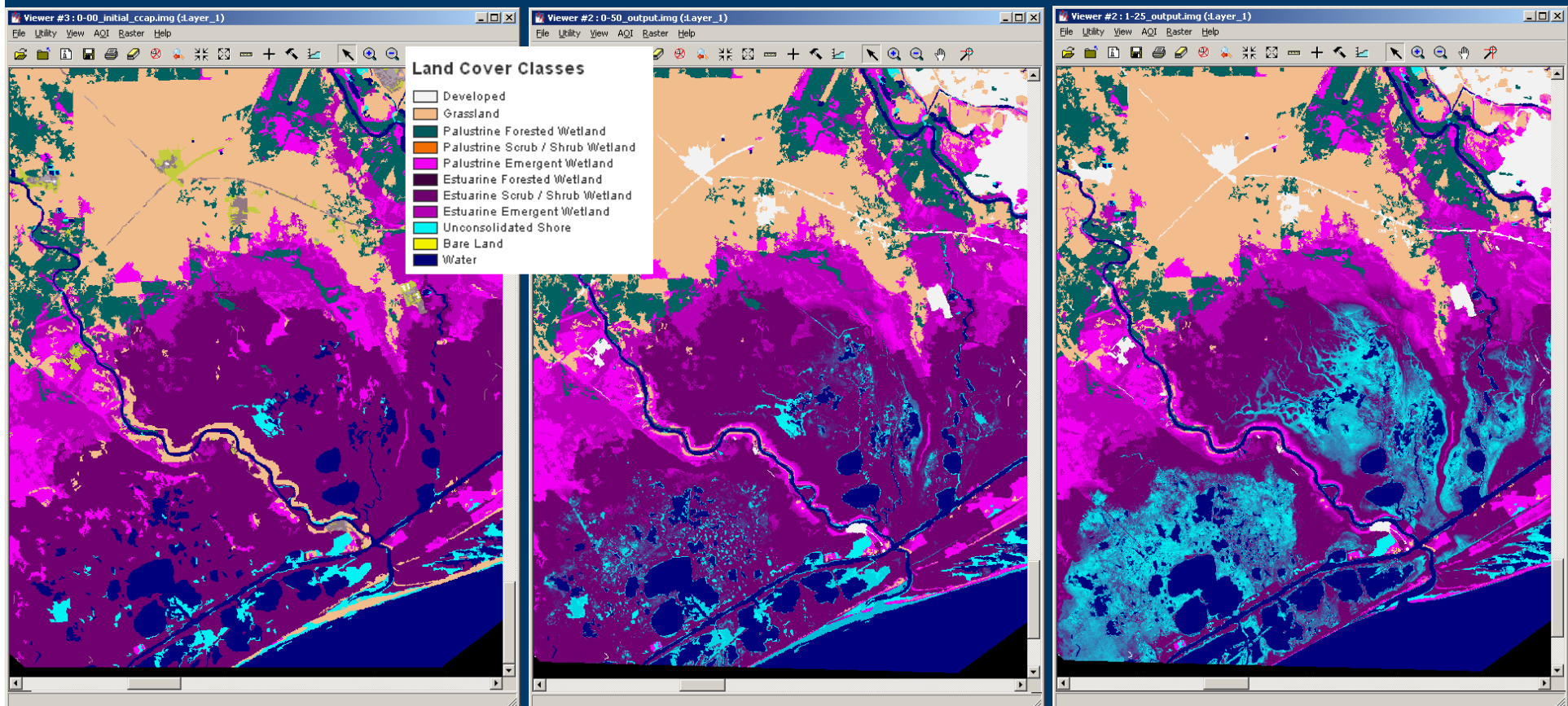
# How Will Habitats be Impacted?

## Spatial Models, Mapping Tools

Initial Conditions

Year 25 Prediction

Year 50 Prediction



*1 m/100 yr SLR, 2 mm/yr accretion rate*



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## Spatial Models, Mapping Tools

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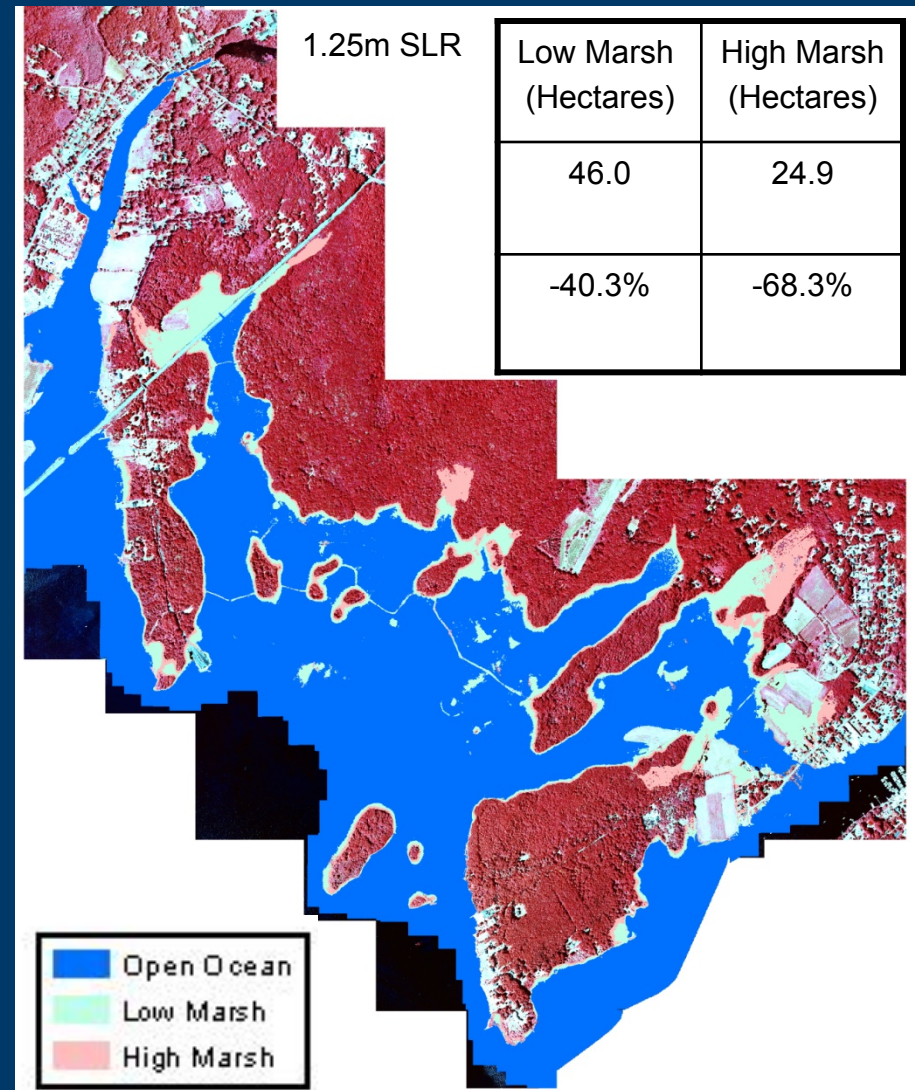
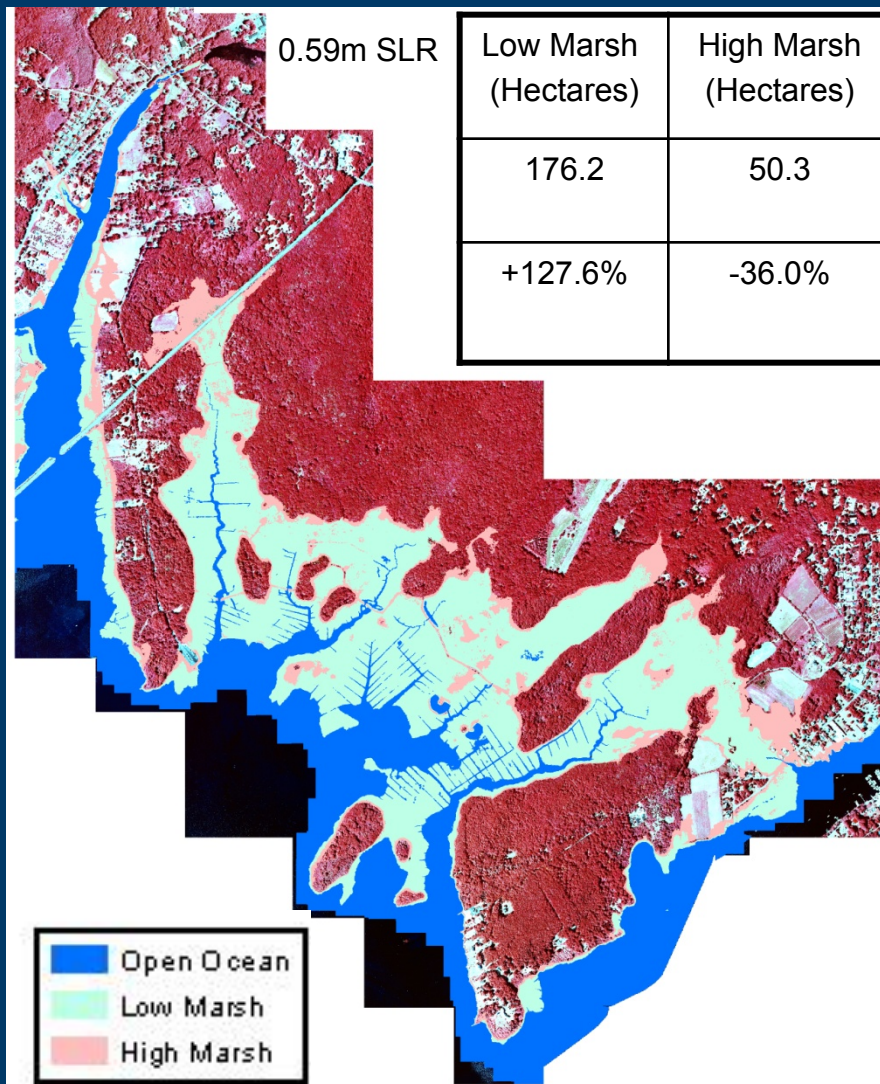
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- Other GIS techniques (Long Island Sound)



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- Habitat Priority Planner



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# Where can you find these basic ingredients?

- NOAA Climate Portal
- Digital Coast



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- NOAA Climate Portal
- Digital Coast
- EBM Tools Network
  - Tools for Predicting and Mitigating Coastal Hazard and Climate Change Impacts
- EPA Climate Ready Estuaries Coastal Vulnerability and Adaptation Tools



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  - Tools for Predicting and Mitigating Coastal Hazard and Climate Change Impacts
- EPA Climate Ready Estuaries Coastal Vulnerability and Adaptation Tools
- HD.gov
- State GIS clearinghouses, state climate websites



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# How do you use these basic ingredients?

## Trainings

- Coastal Inundation Mapping training course & guidebook
- GIS Tools for Strategic Conservation Planning
- Others?



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# How do you use these basic ingredients?

## Guidance

- TNC's Primer for Assessing Impacts and Advancing Ecosystem-based Adaptation
- NWF's Guide to Climate Change Vulnerability Assessment *(to be released soon)*
- TNC's paper on marsh migration modeling/tools for coastal managers *(in development)*



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A photograph of a tropical landscape. In the foreground, a calm body of water reflects the sky and the trees. The middle ground is filled with a dense line of palm trees and other tropical vegetation. The background is a clear blue sky with a few wispy clouds. The word "Questions?" is written in large, white, sans-serif font across the center of the image.

Questions?